

# Designing Your Own Model Ecosystem

An ecosystem exists in an area when the living (biotic) and non-living (abiotic) parts of the environment interact. In this activity, you will study biotic and abiotic elements by creating your own model ecosystem (Figure 1). You will observe any changes that occur in your model ecosystem, as well as any interactions among the biotic and abiotic elements.

## SKILLS MENU

- ☐ Questioning
- ☐ Hypothesizing
- ☐ Predicting
- ☐ Planning
- ☐ Controlling Variables

- ☐ Performing
- ☒ Observing
- ☐ Analyzing
- ☐ Evaluating
- ☒ Communicating



Figure 1 A model ecosystem

## Purpose

To design and build an ecosystem and observe the interactions among the living (biotic) and non-living (abiotic) elements.

## Equipment and Materials

- clear plastic container, such as an aquarium, large jar, or 2 L plastic drink bottle
- light source
- hand lens or magnifying glass
- thermometer
- gravel
- aquarium-grade charcoal
- garden soil
- 2 to 4 small plants
- small animals such as earthworms and isopods (pillbugs)
- water
- dry leaves



clear plastic container



light source



hand lens or magnifying glass



thermometer



gravel



aquarium-grade charcoal



garden soil



2 to 4 small plants



small animals such as earthworms and isopods (pillbugs)



water



dry leaves



Notify the teacher of any allergies that you have. Wash your hands upon completing your ecosystem. Treat animals with care and respect. Do not use mercury thermometers.

## Procedure



1. Use the equipment and materials listed to design a model ecosystem. You can use other items if they are necessary for your design.
2. Make sure that your ecosystem includes the following: good soil drainage, plants and animals, adequate space for the organisms, moisture (water), a way for fresh air to enter and leave, a means of recording temperature, and a way to keep the animals from escaping from the container.
3. Have your teacher approve your design before you begin constructing your model.
4. Build your ecosystem. Record the number and type of plants and animals that you place in your ecosystem.
5. Place the container in a sunny location or under artificial light. Your ecosystem should receive 6 to 8 hours of light per day.
6. Observe your ecosystem regularly. Use a table similar to Table 1 to record your observations. In addition to completing Table 1, use diagrams to illustrate your observations. Describe any changes seen in the organisms or in the activities that the organisms are doing. Record the temperature of the soil, as well as its condition (dry, moist). You may need to add water to maintain moisture in the ecosystem.

**Table 1** Ecosystem Observations

Date	Temperature	Soil condition	Changes

7. Continue observing and maintaining your ecosystem for at least three weeks. Add water as needed.

8. At the end of three weeks, take apart your ecosystem. Release any animals into an appropriate natural habitat, and clean up the remaining materials.

## Analyze and Evaluate

- (a) What are the abiotic elements in your ecosystem? What are the biotic elements?
- (b) Use your observations to explain the interactions between the biotic and abiotic elements in your ecosystem.
- (c) Was your model ecosystem design successful? Explain. How might you design it differently?
- (d) Using your inference skills, describe three interactions that you believe were occurring in your model ecosystem, but that you did not observe directly.
- (e) Is your classroom an ecosystem? Explain.

## Apply and Extend

- (f) Study your observations and diagrams of your ecosystem. What might happen to the ecosystem if you removed it from the light source for a long period of time? Stopped watering it for a long period? Took away another biotic or abiotic element?
- (g) Using the Internet and other sources, research *Biosphere 2*. Imagine that you are designing a similar project. What types of organisms would you include in your biosphere? How would you provide for the needs of all living things in your biosphere?

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## Unit Task

Now that you have designed your own model ecosystem, how might you use this new knowledge in completing the Unit Task?